VIII.—This storm appeared in the rear of high area VI in the Northwest Territory on the 13th. It skirted the high area on the north side and passed along the north border of the country with almost no precipitation, and disappeared in the Gulf of Saint Lawrence on 17th.

IX.—Appeared on the extreme north Pacific coast on 14th. Its motion was se. to Indian Territory on 17th, then ne. to Lake Erie, where it disappeared 20th.

X.—This storm started on 17th to the north of Montana, and moved se. to Missouri 20th. It then moved e. to the middle Atlantic coast, where it disappeared 23d.

XI.—This storm originated like the last three in or near the Northwest Territory. Its motion was in a gentle curve to the south, reaching the Saint Lawrence Gulf on the 25th. Almost no precipitation attended its progress.

XII.—Originated in the south plateau region on the 22d. It moved east to the middle Gulf on the 26th, then turned due north and disappeared over Ohio on the 28th. A secondary from this storm, a. m. of the 27th, was the beginning of a storm which is described among "North Atlantic Storms."

XIII.—This storm also began in the N. W. T. on the 25th. It moved se. to Indian Territory on the 29th, then northeast and was noted on the last day of the month over Lake Michigan. This storm was also remarkably dry in its inception. The lowest pressure was 29.42 on the first few days and maximum winds of 36 and 40 miles were reported from several stations.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.								
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	*	50	109	48	64	5·5	25	Montreal, Que	·46	1	Eastport, Me	21	1	Block Island, R.I	ne.	32	2
II	1	55	113	46	57	9·5	16	Parry Sound, Ont	·42	5	Cheyenne, Wyo	43	2	Oswego, N. Y	nw.	26	5
III	6	51	119	49	54	7·5	30	Norfolk, Va	·62	10	Palestine, Tex	29	7	Kitty Hawk, N.C	n.	34	10
IV	10	51	117	31	96	3·0	26	Fort Buford, N. Dak	·72	10	Denver, Colo	38	10	Galveston, Tex	n.	38	13
V	11	50	114	33	75	5·0	27	Parkersburgh, W. Va	·60	13	Wilmington, N. C	17	15	Kitty Hawk, N.C	nw.	38	15
VI	15	54	108	44	60	3·5	38	White River, Ont	·72	16	Saint Vincent, Minn	22	15	do	ne.	44	17
VII	17	51	92	48	56	3·5	30	Father Point, Que	·50	19	Rockliffe, Ont	24	19	Winnipeg, Man	ne.	20	17
VIII	19	36	100	29	80	2·0	36	Little Rock, Ark	·24	19	Cairo, Ill	15	19	Wichita, Kans	n.	26	19
IX	19	42	124	40	84	4·0	35	Abilene, Tex	·42	21	Abilene, Tex	20	21	Abilene, Tex	n.	36	21
X	22	53	109	49	71	5·5	18	Fort Buford, N. Dak	·46	22	Minnedosa, Man	22	22	Block Island, R. I	n.	36	26
Mean						4·9	28		·52			25				33	
Low areas.									Fall.			Rise.					
I	1	43	121	46	77	3·5	39	Parry Sound, Ont	·42	4	Montgomery, Ala	15	3	Buffalo, N. Y	sw.	52	4
II	3	35	75	49	57	3·0	21	Sydney, C. B. I	·56	5	Montreal, Que	14	3	Block Island, R.I	e.	64	4
III	3	38	115	51	83	6·0	23	Port Arthur, Ont	·56	8	Atlanta, Ga	17	8	Chicago, Ill	e.	48	8
IV	8	28	94	49	64	2·5	39	Eastport, Me	·38	10	Northfield, Vt	14	9	Boston, Mass	w.	46	10
V	8	50	115	50	82	3·5	23	Fort Buford, N. Dak	·50	9	Rapid City, S. Dak	26	9	Fort Buford, N. Dak	nw.	48	10
VI	10	42	105	36	76	2·5	40	Norfolk, Va	·36	12	Augusta, Ga	16	12	Fort Sill, Okla. T	s.	48	10
VII	12	32	88	50	67	2·0	36	Rockliffe, Ont	·78	13	New Orleans, La	14	12	Buffalo, N. Y	sw.	60	13
VIII	13	48	126	48	60	4·0	32	Minnedosa, Man	·60	14	Fort Buford, N. Dak	33	14	Chicago, Ill	w.	52	15
IX	14	48	127	42	81	6·0	22	do	·42	16	Swift Current, N. W. T	24	16	do	sw.	48	17
X	17	52	117	37	72	5·5	23	Valentine, Nebr	·36	19	Moorhead, Minn	20	19	Kitty Hawk, N. C	e.	56	22
XI	20	53	117	47	63	4·5	26	Rapid City, S. Dak	·40	21	Rapid City, S. Dak	20	21	Fort McKinney, Wyo	nw.	48	21
XII	22	35	111	41	84	6·0	16	Manistee, Mich	·28	26	Shreveport, La	13	24	Chicago, Ill	ne.	42	25
XIII	25	51	122	46	87	6·5	19	Green Bay, Wis	·42	30	Palestine, Tex	21	27	do	se.	52	30
Mean						4·3	28		·46			19				51	

* February 26.

NORTH ATLANTIC STORMS FOR MARCH, 1891 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the west part of the north Atlantic Ocean during March, 1891, are shown on Chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

The barometric pressure continued high over mid-ocean during the first decade of the month, although it was unusually low near the Azores from the 5th to 9th. The first important storm of the month was central off the southwest edge of the Grand Banks the morning of the 4th, with fresh to strong gales and a heavy snow storm over south Newfoundland. On the morning of this date a storm of considerable strength was off the south New England coast. At night a sw. gale, with squalls and lightning, prevailed at Bermuda. On the 5th the two storms referred to had apparently united and a storm of marked energy was central southeast of Nova Scotia, with pressure about 29.30 (744), heavy gales and sleet, and heavy rain over south Newfoundland. The morning of the 6th the storm was central over or near the east extremity of Nova Scotia, with pressure below 29.40 (747) and fresh to strong gales, from which position it moved east and on the 7th was central southeast of Newfoundland, after which it moved south of east in the direction of the Azores. On the 8th a storm was central south of Newfoundland, whence it apparently moved southeast and united with an area of low pressure which extended southwest of the Azores from the 5th to the middle part of the month. On the 7th there had been a decided fall in pressure over the British Isles. On the 8th an area of low pressure extended from the British Isles over the Azores. On the 9th a storm of considerable strength, with central pressure about 29.40 (747), was central over the west part of the Bay of Biscay, with severe gales and a heavy snow storm over the south part of Great Britain, where railroad and telegraphic communication was interrupted, and many disasters to shipping were reported. By the 10th the storm-centre had moved eastward over the Bay of Biscay; the heavy storm continued over the south of England, blocking trains with snow, and causing great damage to shipping in the English Channel. Following this storm a severe cold spell set in over England, greatly interfering with the clearing of snow from railroad tracks, and causing loss of life and live stock. From the 11th to 13th a second storm of considerable strength moved eastward from the 20th meridian over the Bay of Biscay. From the 14th to 16th a storm moved eastward from the lower Saint Lawrence valley to the 45th meridian. On the 17th this storm was central about midway between Newfoundland and the Azores; by the 18th it was apparently central near the Azores; by the 19th it had moved east-northeast of the Azores; and by

the 20th had apparently passed eastward over the Bay of Biscay. The evening of the 15th a storm appeared over the west part of the Gulf of Mexico, and by the following evening had moved eastward to the Florida Peninsula. On the 17th a storm of considerable strength was central over the Gulf of Saint Lawrence, whence it moved northeast and disappeared north of the region of observation. On the 19th and 20th a storm of small energy was central off the south Atlantic coast. By the 21st this storm had moved ne. to about the 38th parallel, and by the 22d it had apparently been forced southwest toward the coast by high pressure to the east and northeast. By the 23d this depression had apparently moved southeast and united with a storm which had advanced northwestward to west of Bermuda. On this date a se. hurricane was reported at Bermuda, with pressure falling to 29.54 (750) at 4 p. m., fierce squalls, lightning, and rain. During the 23d and 24th this storm recurved north and northeast to the west of Bermuda, where the barometer fell to 29.43 (748) on the 24th. By the 25th the storm-centre had moved northeast north of Bermuda to the 60th meridian, and at noon of that date the barometer read 29.70 (754) at Bermuda, with a north gale, and squally and hazy weather. The morning of the 26th this storm was located south of the Grand Banks, and a second storm was central over the Gulf of Saint Lawrence, and by the morning of the 27th the two storms had apparently united off the northeast edge of the Grand Banks, after which the storm disappeared north of the region of observation. On the 27th and 28th a storm of moderate strength moved northeast off the south and middle Atlantic coasts, with an apparent increase in energy during the 28th. During the 29th and 30th the storm moved east and north of east, and on the latter-named date it was central off the southeast edge of the Banks of Newfoundland. On the last day of the month this storm was apparently central on the west edge of the Grand Banks, without evidence of marked energy. On the 30th and 31st a storm moved eastward over the ocean in high latitudes, and on the 31st its approach toward the British Isles was indicated by reports from the west of Ireland.

FOG IN MARCH.

The limits of fog-belts on the north Atlantic Ocean west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Fog was reported east of the 55th meridian on 7 dates; between the 55th and 65th meridians on 4 dates; and west of the 65th meridian on 2 dates. Compared with the corresponding month of the last 3 years the dates of occurrence of fog near the Grand Banks for the current month numbered 7 less than the average; between the 55th and 65th meridians 5 less than the average; and west of the 65th meridian 4 less than the average. The fog generally occurred with the approach or passage of general storms. On the 9th a dense fog prevailed over Chesapeake Bay and along the New Jersey coast attending the passage of a general storm of pronounced strength from the Lake region over the Saint Lawrence Valley. On the 21st dense fog prevailed at Boston, Mass., with the passage of a general storm over the Saint Lawrence Valley. Dense fog was also reported at points along the New England, New York, and New Jersey coasts on the 9th, 12th to 14th, and 20th to 24th with the approach of general storms whose influence extended off the coast.

OCEAN ICE IN MARCH.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for March during the last 10 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
March, 1882	42 30	50 00	March, 1882	46 30	46 00
March, 1883	41 46	49 48	March, 1883	48 40	43 03
March, 1884	41 20	54 06	March, 1884	45 00	40 15
March, 1885	40 55	49 04	March, 1885	45 57	43 15
March, 1886	40 20	49 02	March, 1886	47 20	44 40
March, 1887	41 00	49 07	March, 1887	45 31	42 56
March, 1888	42 30	50 37	March, 1888	47 23	46 56
March, 1889	44 20	53 00	March, 1889	44 20	53 00
March, 1890	41 01	50 54	March, 1890	46 40	39 50
March, 1891	42 25	50 30	March, 1891	49 00	43 44
Mean	41 48	50 36	Mean	46 38	44 31

The limits of the region within which icebergs or field ice were reported for March, 1891, are shown on Chart I by ruled shading.

The southernmost ice reported, small bergs and pack ice on the 20th in the position given, was about ½° north of the average southern limit of ice, and the easternmost ice reported, an ice field and bergs on the 24th in the position given, was less than 1° east of the average eastern limit of ice for March. The ice reported was generally confined to the east edge of the Banks of Newfoundland, although it was noted as far west as the east coast of Newfoundland. Compared with March of preceding years the Arctic ice reported for the current month about equaled the average in quantity and distribution. In March, 1889, no icebergs were reported, and the only field ice reported was observed in N. 44° 20′, W. 53° on the 2d.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for March, 1891, is exhibited on Chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme south Florida, where it was above 70, and it was above 60 along the immediate Gulf coast and in adjoining parts of Arizona and California. The mean temperature was above 50 generally in the east and west Gulf states, southwest and west Arizona, and in California, except in the northeast part. The lowest mean temperature was noted in Manitoba and in extreme north Ontario, where it was below 10, and it was below 20 over the north part of the upper lake region, and thence westward over northeast Montana, and at elevated stations in Colorado.

The mean temperature was below the normal, except from the north part of the upper lake region eastward over the Saint Lawrence Valley and north New England, at stations on the south New England coast, in extreme south Florida, and on the middle and south Pacific coasts. The greatest departure below the normal temperature occurred on the middle-eastern and northeast slopes of the Rocky Mountains, where it was more than 8, and the departure below the normal was more than 4 over a greater part of the interior of the country between the Mississippi River and the Pacific coast ranges of mountains. The most marked departure above the normal temperature was noted in east Ontario, Quebec, and New Brunswick, where it was more than 3. In other districts where the temperature was above the normal the departure was less than 1.